

**REMARKS**

By the present Amendment, each of independent claims 1, 3, 20, 21, 24 and 29 have been amended so that the sequence of mixing the specified ingredients has been set forth. Thus, for instance, claim 1 has been amended to define a resin composition to be used in a multi-layer laminate for storing liquid foods comprising a hydrophilic reducing organic compound and a hydrophilic and water insoluble thermoplastic resin wherein the hydrophilic reducing organic compound is included in the hydrophilic and water insoluble resin and the hydrophilic and water insoluble resin provides an oxygen gas barrier for the hydrophilic reducing organic compound and wherein the hydrophilic reducing organic compound and the water insoluble thermoplastic resin are dispersed in a hydrophobic thermoplastic resin. The claim now further recites that the resin composition is prepared by:

kneading the hydrophilic reducing organic compound and the hydrophilic and water insoluble thermoplastic resin at a temperature not higher than the melting temperature or decomposition point of the hydrophilic reducing organic compound and equal to or higher than the melting temperature of the hydrophilic and water insoluble thermoplastic resin to form a kneaded compound; and

kneading the kneaded compound comprised of the hydrophilic reducing organic compound and the hydrophilic and water insoluble thermoplastic resin compound with the hydrophobic thermoplastic resin at a temperature lower than the melting temperature of the water insoluble thermoplastic resin compound and equal to or higher than the melting

temperature of the hydrophobic thermoplastic resin, so that the kneaded compound is dispersed in the hydrophobic thermoplastic resin.<sup>1</sup>

It will be appreciated that the revisions to the independent claims follow the suggestion by the Examiner at the top of page 17 of the Official Action. It will also be evident to those of ordinary skill in the art that the amended claims are consistent with the description provided in the specification, which includes the defined sequence of steps starting at the top of page 6, the description that the hydrophilic reducing organic compound (the "A component") is included in the hydrophobic thermoplastic resin (the "B component") in the first paragraph of page 12 and the specific illustrative embodiments set forth starting on page 15.<sup>2</sup> Such skilled individual will further appreciate from the examples and comparative examples set forth in the specification that the present invention can provide substantially superior results. For instance, as shown by the results involving Embodiments 1-4 in Table 1 on page 18 of the specification, when water is present, oxygen can be effectively absorbed. On the other hand, when no water is present (Reference Examples 1-4), oxygen is not absorbed. Thus, it can be understood that the hydrophilic water insoluble resin provides an oxygen gas barrier for the hydrophilic reducing organic compound until such time that oxygen can permeate through the

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<sup>1</sup> Applicants hereby affirm the election of the subject matter of Group I. However, applicants reserve the right to request rejoiner of the method aspects of the invention currently defined in claims 20 and 21 or to file a divisional application related thereto.

<sup>2</sup> It will be noted that Embodiment 1 uses an ethylene-vinyl alcohol copolymer with a melting point of 160°C as the hydrophilic and water insoluble resin and low density polyethylene (melting point of approx. 116°C as shown in the attached excerpt from the Condensed Chemical Dictionary) as the hydrophobic thermoplastic resin. Thus, it is evident that one can knead at a temperature in accordance with the claims.

hydrophilic and water insoluble thermoplastic resin when the resin is wetted (such as by the contents of a contained material).<sup>3</sup>

The evidence that has been submitted during the prosecution confirms the importance of this defined sequence. For instance, in the Declaration under 37 C.F.R. §1.132 submitted by mail on May 16, 2001, Comparative Examples were provided which showed that when all the compounds are kneaded together, rather than in the defined sequence, the hydrophilic reducing organic compound is depleted even in the absence of water. Thus, it is without question that the claims of record define subject matter which is substantially different from material which is prepared when a different sequence is followed. In this regard, applicants have noted the Examiner's comments on page 16 of the Action that only one of the Comparative Examples relates to the examples of the specification and respectfully invite the Examiner consider that Invention Embodiment 2 of the Declaration relates to Embodiment 2 of the specification, Invention Embodiment 3 of the Declaration relates to Embodiment 3 of the specification, and that Comparative Example B and Comparative Example C use the same compounds as Invention Embodiments 2 and 3, respectively, but combine all ingredients together simultaneously.

With a proper understanding of the present invention and the significant advantageous results which may be obtained therefrom, applicants respectfully submit that none of the numerous proposed combinations of prior art set forth in the fourteen (14) numbered paragraphs of the Official Action disclose or suggest any aspect of the defined

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<sup>3</sup> This understanding of the invention was emphasized in the Declaration under 37 C.F.R. § 1.132 submitted on May 23, 2002.

invention and actually demonstrate an improper reliance on applicants' own specification and/or do not take into consideration specific teachings within the documents themselves that would counsel away from the proposed combination. With the foregoing background in mind, the various rejections set forth in the Official Action will not be addressed.

The Examiner has rejected a first group of claims as allegedly being unpatentable over the combination of Koyama et al., U.S. Patent No. 5,274,024, in view of Laid-Open Japanese Patent No. 56-96686 and Teumac et al., U.S. patent No. 5,663,223. Koyama et al. relates to an oxygen-absorbing resin composition which can be used for preserving water-containing contents such as drinks and pre-cooked food. The composition comprises a heat-formable resin or resin composition having a defined oxygen permeation coefficient and a water adsorption of at least 1% in pure water at 20°C and an oxygen scavenger incorporated into the resin or resin composition. The composition can be formulated into a laminate, a liner, a cap or a vessel. The resin composition is disclosed in the passage beginning at column 5, line 32 and is described as being a blend of a specific water-absorbing resin with an olefin resin, more specifically a blend of a polymer selected from the group consisting of a modified polyethylene oxide, a vinyl alcohol polymer, a sodium acrylate polymer and an acrylic acid/vinyl alcohol copolymer with an olefin resin. The oxygen scavenger used in the composition is disclosed in the passage beginning at the top of column 4 and is a water-insoluble oxygen scavenger which is preferably reducing iron (which is used in each of the illustrative Examples).

It is without question that the composition described in Koyama et al. is substantially different from that defined in the claims of record. As the Examiner has

indicated on page 4 of the Action, the patent does not disclose the specifically defined sequence wherein the hydrophilic reducing organic compound and the hydrophilic and water insoluble thermoplastic resin are first combined and the thusly obtained kneaded compound is then mixed with the hydrophobic thermoplastic resin and certainly does not recognize the advantages which can be obtained therefrom. Quite to the contrary, Koyama et al. requires a blend of the components and, in Example 1 illustrates the importance of a blend of all three components mixed together relative to a material made from only one or the other of the resin components with the reducing iron. Therefore, there is no doubt that Koyama et al. requires (as further reflected in the claims) a blend of the three defined components in the manner taught by the patent which is directly contrary to the specifically defined sequence set forth in the claims of record. Indeed, not only are the claims patentable over Koyama et al., but even attempting to modify the teachings in order to try to reach the recitation set forth in the claims, would be totally contrary to the teachings set forth in the patent.

The additional reliance on the cited Japanese document (hereafter referred to as Daiichi Seiyaku) would not result in any aspect of the present invention and will actually be inconsistent with the teachings found within the document itself and those of Koyama et al. More specifically, Daiichi Seiyaku discloses the use of indirect additives containing ascorbic acid and particularly zeolite on which ascorbic acid is adsorbed. As indicated at the bottom of the English translation of the excerpt from page 3 of the document, the antioxidant agent support is filled into small bags that breathe well and which are incorporated into the contents of the material similar to the conventional presence of bags

containing silica gel which one can find in a variety of containers.<sup>4</sup> Such use is significantly different from incorporating the material into a resin composition forming a portion of the container as described in Koyama et al. Moreover, Koyama et al. specifically describes a preference to metal powders, particularly reducing iron and to attempt to substitute ascorbic acid as the oxygen scavenger would be proceeding contrary to the stated preferable material in Koyama et al. Thus, absent improper resort to applicants' own specification, those of ordinary skill in the art would not contemplate combining the respective teachings of the documents in the manner suggested by the Examiner.

Teumac et al. has been relied on to allegedly show that oxygen scavengers that were once added directly to foodstuffs are now being incorporated into the food-packaging container. What this section of the patent actually states is that "attempts" have been made to incorporate the oxygen scavenger into the container and not that it is a common practice. What Teumac et al. actually teaches, as is evident from the paragraph beginning at column 4, line 25, is a liner composition which specifically includes at least an inorganic sulfite compound or a tocopherol compound in an amount sufficient to protect against development of off-flavor in a potable fluid in the container. Based on this specific teaching, one would be directed to the use of an inorganic sulfite compound or a tocopherol compound, and not the oxygen scavenger disclosed in Daiichi Seiyaku which is neither an inorganic sulfite compound nor a tocopherol compound and is specifically taught in a

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<sup>4</sup> Applicants are currently planning to provide a more complete translation of the document to illustrate this point.

location which is separate from any liner. Moreover, even if one could rely on the teachings of Teumac et al., one would still not arrive at the presently claimed invention since the patent likewise does not teach the specifically defined sequence nor in any way provide a recognition of the significant advantages which can be obtained therefrom. Thus, all the claims now of record are patentable over this combination of documents.

The Examiner has additionally relied on Moritani et al., U.S. Patent No. 4,999,229, with the previously three stated documents in order to reject claims 12 and 13. Moritani et al. has been cited to teach a three-layer laminate comprising an inner layer having low moisture permeability, an intermediate gas-barrier layer, and an outer layer.

There is a considerable question as to whether the teachings of Moritani et al. can be combined with the hypothetically modified material of Koyama et al. in the manner suggested by the Examiner. In the passage beginning at column 12, line 3, Moritani et al. specifically describes that the multi-layered packaging material is designed for packaging food which has been deaerated or the air replaced by an inert gas and then tight-sealed by heat-sealing or the like and further subjected to sterilization by boiling or retorting. This description, coupled with the absence of a description setting forth a need for an oxygen absorbent again leads to the conclusion that an improper resort to applicants' own specification has been made. In addition, even if a proper basis for combining the documents existed, one would still not arrive at the presently claimed invention since Moritani et al. in no way remedies the deficiencies described above with regard to the specific sequence defined in the claims which has been shown to provide a significant affect on the characteristics of the material.

As an alternative to Koyama et al., the Examiner has relied on Bettle, III, U.S. Patent No. 5,320,889, with Daiichi Seiyaku and Teumac et al. This hypothetical combination of documents is even further removed from the present invention since Bettle, III does not describe the presence of an oxygen scavenger and actually provides a reason as to why one would not be necessary. More specifically, the Examiner has alleged that it would be obvious to use an oxygen scavenger in the layer comprising HDPE/EVOH which is indicated by reference number 38 in Fig. 2. However, as plainly stated in the patent, the separate EVOH layer (reference number 42) is described as providing a complete oxygen barrier which protects the contents of the bottle. This is evident from the description provided in the last paragraph of column 4 and in particular the last sentence thereof which states:

The wet side of the EVOH layer thus also functions as an oil barrier, and the dry portion of the EVOH layer, protected from both interior moisture and exterior moistures, functions as an oxygen barrier, thus providing a package which has superior flavor and taste retention properties.

Of course, even if there existed a proper basis for combining the respective documents, it still would not lead to any aspect of the invention as defined in the claims of record as there is again nothing which teaches the described sequence which has been shown to provide a material which is different from one wherein all components are blended together.

The rejection set forth in Section 4 of the Official Action relies on the combination of Lofgren et al., U.S. Patent No. 5,133,999, in view of Daiichi Seiyaku and Teumac et al. Similar to that which was stated with respect to Bettle, III, Lofgren et al. does not



describe the presence of an oxygen scavenger or the need for such a material. In this respect, the patent describes a layer indicated by reference number 14 in Fig. 1 that serves as an oxygen and flavor barrier. This barrier is discussed in the sentence bridging columns 2 and 3 which states:

According to the present invention, it has been [found] that a barrier layer consisting of a mixture of the non-polar component polyethylene and the polar component ethylene vinyl alcohol co-polymer not only displays superior barrier properties vis-a-vis oxygen but also vis-a-vis flavour and odour ingredients of both polar and non-polar nature, and it has surprisingly been [found] that this barrier layer possesses better flavour barrier properties taken as a whole than a corresponding barrier layer consisting only of ethylene vinyl alcohol copolymer or a barrier of pure ethylene vinyl alcohol copolymer coated with polyethylene.<sup>5</sup>

Accordingly, again absent improper reliance on applicants' own specification, those of ordinary skill in the art would find no reason for attempting to place an oxygen scavenger in a location where none is disclosed or stated as being required. Moreover, one would certainly not then replace the preferred oxygen scavenger noted in Koyama et al. with a totally different material used in a different location as disclosed in Daiichi Seiyaku. Thus, this combination of documents is also far removed from the presently claimed invention and the claims of record are clearly patentable thereover.

The next combination of documents relies on Itamura et al., U.S. Patent No. 5,492,953, with Daiichi Seiyaku and Teumac et al.. Itamura et al. relates to a resin composition comprising (A) a polyolefin, (B) a saponified product of an ethylene-vinyl acetate copolymer having defined characteristics, at least one of (C<sub>1</sub>) at least one inorganic

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<sup>5</sup> It is believed that the word "found" should be present at the indicated places.

substance selected from titanium oxide, talc, calcium carbonate, mica and absorptive inorganic materials, (C<sub>2</sub>) at least one compound selected from the group consisting of metal salts of certain higher fatty acids, metal salts, metal salts of ethylenediaminetetracarboxylic acid, and hydrotalcite, and (C<sub>3</sub>) a polyolefin modified with an unsaturated carboxylic acid or derivatives thereof, and (D) a saponified product of an ethylene-vinyl acetate copolymer having defined characteristics.

The absorptive materials are described in greater detail in the passage beginning at column 4, line 6. In this paragraph, the materials are specified as being "water-absorptive inorganic material" which include numerous salts and which are described as functioning to minimize deterioration of the gas barrier property of EVOH due to the absorption of moisture invading from the outside.

Even if the absorptive inorganic material is selected from the other alternatives, it is evident that it is for the purpose of absorbing water, not oxygen, the presence of which oxygen is protected against by the "high gas barrier property" of the component (D) as indicated in the sentence bridging columns 2 and 3. Thus, there is again no proper basis for making the proposed combination advanced in the Official Action. Furthermore, if the absorptive material is being relied on to justify the combination, it is without question that the patent requires an inorganic material and not ascorbic acid as described in Daiichi

Seiyaku. Of course, this material is disclosed as being loaded into small bags which again is significantly different than the environment of the container.<sup>6</sup> Accordingly, the presently claimed invention is also patentable over the hypothetical combination of documents set forth in Section 5 of the Official Action.

Hekal, U.S. Patent No. 6,130,263, is a further document that constitutes the primary document in combination with Daiichi Seiyaku and Teumac et al. While applicants do not concede that this patent constitutes "prior art" against the claims of the present invention given the two continuation-in-part applications relied on in the patent and in light of the priority dates claimed in the present application along with the verified English translations provided with the response mailed on February 28, 2000. However, even if proper reliance can be made on Hekal, the patent would still not lead those of ordinary skill in the art to the presently-claimed invention even when considered with Daiichi Seiyaku. Hekal relates to a polymer which contains a desiccant entrained therein. A desiccant is specifically designed to absorb moisture and can be one of three different types as set forth in column 7. In order to form veins or channels that act as moisture communicating passages throughout the polymer, a channeling agent is present in the polymer matrix (sentence bridging columns 6 and 7). The channeling agent is described with greater specificity in the paragraph bridging columns 12 and 13 and is preferably a hydrophilic polar compound having at least several hydroxy groups. One technique of

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<sup>6</sup> As noted in *Ex parte Hartmann*, 186 USPQ 366 (Bd. App. 1974), references cannot be properly combined if the effect would be to destroy the invention on which one of the reference patents is based.

preparing the material is to combine the polymer-based matrix, the desiccating agent and the channeling agent together, preferably when all three components are in a powder state and before the polymer base is in a molten state (column 8, lines 12-15). Alternatively, the desiccating agent can be combined with a polymer that acts as a moisture barrier and then the channeling agent can be blended therein (column 10, lines 16 *et seq.*).

Based on the clear teachings of Hekal, those of ordinary skill in the art would not combine the teachings of Daiichi Seiyaku in the manner suggested by the Examiner. In essence, the Examiner has alleged that it would be obvious to try the ascorbic acid-containing zeolite of Daiichi Seiyaku in the polymer matrix of Hekal irrespective of the fact that Hekal does not indicate any requirement for an oxygen scavenger and Daiichi Seiyaku describes the presence of the ascorbic acid-containing zeolite in a porous bag in interior of the container, and not in the container structure itself. Such a situation would clearly counsel away from the proposed combination of documents. Furthermore, even if there existed some valid reason for combining the documents, it still would not result in the presently claimed invention with the defined sequence discussed above and would certainly not lead to an appreciation of the significant advantage which can be obtained in accordance with the present invention. Thus, the claims of record are also patentable over this combination of documents.

The remaining documents, namely Hofeldt et al., U.S. Patent No. 5,204,389, has been relied on for its teaching of an effective amount of ascorbate, while Blinka et al., U.S. Patent No. 5,834,079, has been relied on to show that zeolites may be added to oxygen scavenger-containing compositions in order to adsorb odor-causing reaction by-

products. Even if proper reliance could be made on the teachings of such additional documents, they still would not lead to the presently claimed invention with the defined sequence or an appreciation of the advantages which can be obtained therefrom. For instance, as discussed above, Bettle, III, Lofgren et al. and Itamura et al. do not disclose the presence of an oxygen scavenger or the need for one. Quite to the contrary, the explicit teachings of the documents relating to their respective gas barrier properties would lead those of ordinary skill in the art to understand that an oxygen scavenger is not required. To then rely on Hofeldt et al. to show that it would be "obvious" to use an oxygen scavenger where none is disclosed as being need, would certainly be an improper use of applicants' invention, would be the application of an improper "obvious to try" standard under 35 U.S.C. §103, and would be contrary to teachings in the documents themselves.<sup>7</sup>

Even to the extent that the prior art describes the presence of an oxygen scavenger and to the extent that the teachings of Hofeldt et al. could be combined, such combination would not lead to any aspect of the invention. In this respect, the claims specifically recite a sequence wherein the hydrophilic reducing organic compound (or both the hydrophilic reducing organic compound and the porous inorganic compound) are first kneaded with the water insoluble thermoplastic resin wherein the hydrophilic reducing organic compound is

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<sup>7</sup> See, e.g., *In re Mercier*, 185 USPQ 774 (CCPA 1975) where the court stated in reversing a rejection:

The relevant portions of a reference include not only those teachings which would suggest particular aspects of an invention to one having ordinary skill in the art, but also teachings which would lead such a person away from the claimed invention. (citation omitted)

included in the hydrophilic and water insoluble resin and the hydrophilic and water insoluble thermoplastic resin provides an oxygen gas barrier. Hofeldt et al. at best only teaches the use of a moisture barrier and certainly does not teach the specific sequence defined in the claims of record. Therefore, even if Hofeldt et al. can be properly combined with any of the other cited documents, it still would not lead to any aspect of the presently claimed invention.

As to Blinka et al., which has been used as a final document in the final ground for rejection, applicants note that while additional distinctions exist, this patent was removed as "prior art" via the submission of the verified English translations of the priority documents, as explained in the Remarks of the response mailed on February 28, 2000. If the Examiner is now going to again rely on this document, applicants request an explanation for this reliance.

Accordingly, none of the numerous hypothetical combinations of documents (to the extent that they are actually "prior art") would in anyway lead to the aspects of the present invention defined in the claims of record.

With respect to the Examiner's positions concerning the arguments which were previously presented, applicants have amended the claims to define the invention with greater precision (in a manner consistent with the Examiner's suggestion) and have pointed out above that the evidence which has been made of record includes several Comparative Examples, not just the one noted on page 16 of the Action. Thus, applicants have also met the points raised in this section of the Action.

Since the claims now of record define the various aspects of the invention in a manner which is neither disclosed nor suggested by the various combinations of documents (even assuming that all may be considered full prior art), applicants respectfully request reconsideration and allowance of the present application.

Should the Examiner wish to discuss any aspect of the application, he is invited to contact the undersigned attorney at the number provided below.

Respectfully submitted,

BURNS, DOANE, SWECKER & MATHIS, L.L.P.

By: Robert G. Mukai  
Robert G. Mukai  
Registration No. 28,531

P.O. Box 1404  
Alexandria, Virginia 22313-1404  
(703) 836-6620

Date: November 4, 2002

**Attachment to Amendment Dated November 4, 2002**

**Marked-up Claims 1, 3, 20, 21, 24 and 29**

1. (Four Times Amended) A resin composition to be used in a multi-layer laminate for storing liquid foods, comprising a hydrophilic reducing organic compound [kneaded with] and a hydrophilic and water insoluble thermoplastic resin, wherein the hydrophilic reducing organic compound is included in the hydrophilic and water insoluble thermoplastic resin and the hydrophilic and water insoluble resin provides an oxygen gas barrier for the hydrophilic reducing organic compound and wherein the [kneaded] hydrophilic reducing organic compound and the water insoluble thermoplastic resin are [kneaded with and] dispersed in a hydrophobic thermoplastic resin wherein the resin composition is prepared by:

kneading the hydrophilic reducing organic compound and the hydrophilic and water insoluble thermoplastic resin compound at a temperature not higher than the melting temperature or decomposition point of the hydrophilic reducing organic compound and equal to or higher than the melting temperature of the hydrophilic and water insoluble thermoplastic resin to form a kneaded compound; and

kneading the kneaded compound comprised of the hydrophilic reducing organic compound and the hydrophilic and water insoluble thermoplastic resin compound with the hydrophobic thermoplastic resin at a temperature lower than the melting temperature of the water insoluble thermoplastic resin compound and equal to or higher than the melting temperature of the hydrophobic thermoplastic resin, so that the kneaded compound is dispersed in the hydrophobic thermoplastic resin.



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**Marked-up Claims 1, 3, 20, 21, 24 and 29**

3. (Four Times Amended) A resin composition to be used in a multi-layer laminate for storing liquid foods, comprising a hydrophilic reducing organic compound, [kneaded with] a porous inorganic compound, and a hydrophilic and water insoluble thermoplastic resin, wherein the hydrophilic reducing organic compound is included in the hydrophilic and water insoluble thermoplastic resin and the hydrophilic and water insoluble thermoplastic resin provides an oxygen gas barrier for the hydrophilic reducing organic compound and wherein the [kneaded] hydrophilic reducing organic compound, the porous inorganic compound and the water insoluble thermoplastic resin are [kneaded with and] dispersed in a hydrophobic thermoplastic resin wherein the resin composition is prepared by:

kneading the hydrophilic reducing organic compound, the porous inorganic compound and the hydrophilic and water insoluble thermoplastic resin compound at a temperature not higher than the melting temperature or decomposition point of the hydrophilic reducing organic compound and equal to or higher than the melting temperature of the hydrophilic and water insoluble thermoplastic resin to form a kneaded compound; and

kneading the kneaded compound comprised of the hydrophilic reducing organic compound, the porous inorganic compound and the hydrophilic and water insoluble thermoplastic resin compound with the hydrophobic thermoplastic resin at a temperature lower than the melting temperature of the water insoluble thermoplastic resin compound

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and equal to or higher than the melting temperature of the hydrophobic thermoplastic resin,  
so that the kneaded compound is dispersed in the hydrophobic thermoplastic resin.

20. (Thrice Amended) A method of producing a resin composition to be used in a multi-layer laminate for packaging liquid foods, comprising the steps of kneading a hydrophilic reducing organic compound and a hydrophilic and water insoluble thermoplastic resin compound, at a temperature not higher than the melting point or decomposition point of the hydrophilic reducing organic compound and equal to or higher than [not lower than] the melting temperature of the hydrophilic and water insoluble thermoplastic resin, to make a kneaded compound, wherein the hydrophilic reducing organic compound is included in the hydrophilic and water insoluble thermoplastic resin and the hydrophilic and water insoluble resin provides an oxygen gas barrier for the hydrophilic reducing organic compound and [dispersing the kneaded compound in a hydrophobic thermoplastic resin] kneading the kneaded compound comprised of the hydrophilic reducing organic compound and the hydrophilic and water insoluble thermoplastic resin compound with a hydrophobic thermoplastic resin at a temperature lower than the melting temperature of the water insoluble thermoplastic resin compound and equal to or higher than the melting temperature of the hydrophobic thermoplastic resin,  
so that the kneaded compound is dispersed in the hydrophobic thermoplastic resin.

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**Marked-up Claims 1, 3, 20, 21, 24 and 29**

21. (Thrice Amended) A method of producing a resin composition to be used in a multi-layer laminate for packaging liquid foods, comprising the steps of kneading a hydrophilic reducing organic compound, a porous inorganic compound, and a hydrophilic and water insoluble thermoplastic resin compound at a temperature not higher than the melting temperature or decomposition point of the hydrophilic reducing organic compound and equal to or higher than the melting temperature of the hydrophilic and water insoluble thermoplastic resin, wherein the hydrophilic reducing organic compound is included in the hydrophilic and water insoluble thermoplastic resin and the hydrophilic and water insoluble thermoplastic resin provides an oxygen gas barrier for the hydrophilic reducing organic compound to make a kneaded compound, and [dispersing the kneaded compound in a hydrophobic thermoplastic resin] kneading the kneaded compound comprised of the hydrophilic reducing organic compound, the porous inorganic compound and the hydrophilic and water insoluble thermoplastic resin compound with the hydrophobic thermoplastic resin at a temperature lower than the melting temperature of the water insoluble thermoplastic resin compound and equal to or higher than the melting temperature of the hydrophobic thermoplastic resin, so that the kneaded compound is dispersed in the hydrophobic thermoplastic resin.

24. (Amended) A pellet to be used in a multi-layer laminate for storing liquid foods, comprising a hydrophilic reducing organic compound [kneaded with] and a

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**Marked-up Claims 1, 3, 20, 21, 24 and 29**

hydrophilic and water insoluble thermoplastic resin, wherein the hydrophilic reducing organic compound is included in the hydrophilic and water insoluble thermoplastic resin and the hydrophilic and water insoluble thermoplastic resin provides an oxygen gas barrier for the hydrophilic reducing organic compound and wherein [the kneaded hydrophilic reducing organic compound and the water insoluble thermoplastic resin are kneaded with and dispersed in a hydrophobic thermoplastic resin] the pellet is prepared by:

kneading the hydrophilic reducing organic compound and the hydrophilic and water insoluble thermoplastic resin compound at a temperature not higher than the melting temperature or decomposition point of the hydrophilic reducing organic compound and equal to or higher than the melting temperature of the hydrophilic and water insoluble thermoplastic resin to form a kneaded compound;

kneading the kneaded compound comprised of the hydrophilic reducing organic compound and the hydrophilic and water insoluble thermoplastic resin compound with the hydrophobic thermoplastic resin at a temperature lower than the melting temperature of the water insoluble thermoplastic resin compound and equal to or higher than the melting temperature of the hydrophobic thermoplastic resin, so that the kneaded compound is dispersed in the hydrophobic thermoplastic resin; and

forming a pellet from the hydrophobic thermoplastic resin containing the dispersed kneaded compound.

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**Marked-up Claims 1, 3, 20, 21, 24 and 29**

29. (Amended) A pellet to be used in a multi-layer laminate for storing liquid foods, comprising a hydrophilic reducing organic compound, [kneaded with] a porous inorganic compound and a hydrophilic and water insoluble thermoplastic resin, wherein the hydrophilic reducing organic compound is included in the hydrophilic and water insoluble thermoplastic resin and the hydrophilic and water insoluble thermoplastic resin provides an oxygen gas barrier for the hydrophilic reducing organic compound and wherein [the kneaded hydrophilic reducing organic compound, the porous inorganic compound and the water insoluble thermoplastic resin are kneaded with and dispersed in a hydrophobic thermoplastic resin] the pellet is prepared by:

kneading the hydrophilic reducing organic compound, the porous inorganic compound and the hydrophilic and water insoluble thermoplastic resin compound at a temperature not higher than the melting temperature or decomposition point of the hydrophilic reducing organic compound and equal to or higher than the melting temperature of the hydrophilic and water insoluble thermoplastic resin to form a kneaded compound;

kneading the kneaded compound comprised of the hydrophilic reducing organic compound, the porous inorganic compound and the hydrophilic and water insoluble thermoplastic resin compound with the hydrophobic thermoplastic resin at a temperature lower than the melting temperature of the water insoluble thermoplastic resin compound

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and equal to or higher than the melting temperature of the hydrophobic thermoplastic resin,  
so that the kneaded compound is dispersed in the hydrophobic thermoplastic resin; and  
forming a pellet from the hydrophobic thermoplastic resin containing the dispersed  
kneaded compound.

*Hawley's*  
*Condensed Chemical*  
*Dictionary*

**TWELFTH EDITION**

*Revised by*  
Richard J. Lewis, Sr.



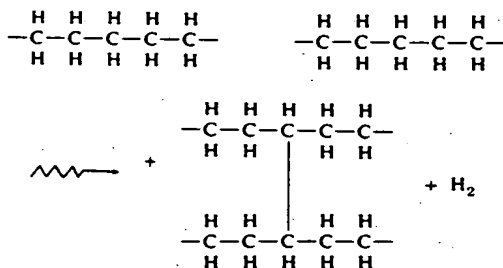
VAN NOSTRAND REINHOLD COMPANY  
New York

skeleton such as  $\text{HO}-\text{C}-\text{C}-\text{O}-\text{C}-\text{C}-\text{O}-\text{C}-\text{C}-\text{O}-\text{C}-\text{C}-\text{OH}$ . The length of the chain can vary widely and the number of consecutive carbon atoms may be greater than two. Examples are polyethylene glycol and polypropylene glycol.

**polyethylene.** CAS: 9002-88-4.  $(-\text{CH}_2\text{CH}_2-)_n$ , chlorosulfonated. See "Hypalon." cross-linked (XLPE).

**Properties:** Thermosetting white solid, high-temperature-resistant, excellent resistance to chemicals and to creep, high impact and tensile strength, high electrical resistivity, insoluble in organic solvents, does not stress-crack. Combustible.

**Derivation:** (1) By irradiating linear polyethylene with electron beam or  $\gamma$ -radiation, cross-linking taking place through a primary valence bond, as shown.



(2) By a chemical cross-linking agent such as an organic peroxide (e.g., benzoyl peroxide). All grades of polyethylene and most copolymers can be chemically cross-linked.

**Use:** Wire and cable coatings and insulation (low-density grades), pipe and molded fittings (high-density grades). Special types having low electrical resistivity can be made; these can be regarded as semiconductors.

**Note:** In molding cross-linked polyethylene, the desired part must be formed before cross-linking is initiated, as material will not change its shape after cross-linking. The variations in composition and wide range of properties approach the ideal of a universal material more closely than most polymers.

#### Density

The density of polyethylene and other thermoplastic polymers is affected by the shape and spacing of the molecular chains; low-density materials have highly branched and widely spaced chains, whereas high-density materials have comparatively straight and closely aligned chains. Polymers of the latter type are called linear. The physical properties are markedly affected by increasing density.

#### Low-density (branched chain)

**Properties:** Crystallinity 50-60%, d 0.915, mp 240F, tensile strength 1,500 psi, impact strength

$\sim 116^\circ\text{C}$

above 10 ft-lb/inch/notch, thermal expansion  $17 \times 10^{-5}$  inch/inch/C, soluble in organic solvents above 200F, insoluble at room temperature.

**Derivation:** (1) Ethylene is polymerized in a free-radical-initiated liquid phase reaction at 1500 atm (22,000 psi) and 375F with oxygen as catalyst (usually from peroxides). (2) A much more effective and cheaper process uses pressures of only 100-300 psi at less than 212F; the catalyst is undisclosed and reaction is vapor-phase.

**Use:** Packaging film (especially for food products), paper coating, liners for drums and other shipping containers, wire and cable coating, toys, cordage, refuse and waste bags, chewing-gum base, squeeze bottles, electrical insulation.

#### High-density (linear)

**Properties:** Crystallinity 90%, d 0.95, mp 275F, tensile strength 4000 psi, impact strength 8 ft-lb/in notch, high electrical resistivity, film is gas-permeable, hydrophobic, does not resist nitric acid.

**Derivation:** Ethylene polymerized by Ziegler catalysts at 1-100 atm (15-1500 psi) at from room temperature to 200F. Catalyst is a metal alkyl, e.g., triethylaluminum plus a metallic salt ( $\text{TiCl}_4$ ) dissolved in a hydrocarbon solvent. A vapor-phase modification of this process was developed in 1965. Another method uses such metallic catalysts as  $\text{Cr}_2\text{O}_3$  at 100-500 psi with solvents such as cyclohexane or xylene.

**Use:** Blow-molded products, injection-molded items, film and sheet, piping, fibers, gasoline and oil containers.

**Note:** Ethylene may be copolymerized with varying percentages of other materials, e.g., 2-butenes or acrylic acid; a crystalline product results from copolymerization of ethylene and propylene. When butadiene is added to the copolymer blend, a vulcanizable elastomer is obtained.

#### Low molecular weight

**Properties:** Molecular weight 2000-5000. Translucent white solids, excellent electrical resistance, abrasion-resistant, resistant to water and most chemicals, d 0.92. Slightly soluble in turpentine, petroleum naphtha, xylene, and toluene at room temperature; soluble in xylene, toluene, trichloroethylene, turpentine, and mineral oils at 82.2C; practically insoluble in water; slightly soluble in methyl acetate, acetone, and ethanol up to the boiling points of these solvents. Available as emulsified and non-emulsified forms. Combustible.

**Use:** Mold-release agent for rubber and plastics, paper and container coatings, liquid polishes, and textile finishing agents.

**polyethylene glycol.** (PEG; poly(oxyethylene); polyglycol; polyether glycol).

CAS: 25322-68-3. Any of several condensation polymers of ethylene glycol with the general formula  $\text{HOCH}_2(\text{CH}_2\text{OCH}_2)_n\text{CH}_2\text{OH}$  or



**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Patent Application of	)	
	)	
Morio HARA et al.	)	Group Art Unit: 1773
	)	
Application No.: 08/973,416	)	Examiner: K. Krueer
	)	
Filed: November 14, 1997	)	
	)	
For: RESIN COMPOSITION AND	)	
LAMINATE FOR STORAGE OF	)	
LIQUID FOODS	)	

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12/14/02

**SUBMISSION OF TRANSLATION OF JAPANESE DOCUMENT**

Assistant Commissioner for Patents  
Washington, D.C. 20231

Sir:

In further response to the Official Action dated July 2, 2002, and supplementing the Amendment filed on November 4, 2002, applicants are hereby providing a more complete English translation of the substance of Laid-open Japanese Patent No. 56-96686 (referred to as Daiichi Seiyaku) consistent with the footnote on page 13 of the aforementioned Amendment.

As may be seen from the translation and particularly the bracketed portions therein, Daiichi Seiyaku describes indirect additives and unquestionably teaches the importance of a zeolite support for ascorbic acid. Furthermore, when the zeolite carrying the ascorbic acid is used to treat food, the zeolite is placed into porous bags that are included directly with the food. Thus, as maintained in the aforementioned Amendment, Daiichi Seiyaku would not lead to using ascorbic acid in a container structure. If anything, Daiichi Seiyaku would lead those of ordinary skill in the art to use an oxygen scavenger in a porous bag that is

provided with a food substance and, as such, would lead away from the present invention. Such a teaching cannot be ignored in assessing the propriety of all the hypothetical combinations of documents set forth in the Official Action, especially those which rely on Daiichi Seiyaku.<sup>1</sup>

Accordingly, applicants respectfully submit that the attached translation further supports the understanding that the present invention is patentable over the documents identified in the Official Action and applicants therefore again request reconsideration and allowance of the present application based on the claims, arguments and evidence of record.

Respectfully submitted,

BURNS, DOANE, SWECKER & MATHIS, L.L.P.

By: Robert G. Mukai  
Robert G. Mukai  
Registration No. 28,531

P.O. Box 1404  
Alexandria, Virginia 22313-1404  
(703) 836-6620

Date: December 4, 2002

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<sup>1</sup> As noted in footnote 7 and emphasized here: "The relevant portions of a reference include not only those teachings which would suggest particular aspects of an invention to one having ordinary skill in the art, but also teachings which would lead such a person away from the claimed invention." *In re Mercier*, 185 USPQ 774 (CCPA, 1975)(citation omitted).

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**English Language Translation of Daiichi Seiyaku (Laid-Open  
Japanese Patent No.56-96686)**

**SPECIFICATION**

5 1. Title of the Invention

Deterioration inhibitor for foods

2. Claim

A deterioration inhibitor for foods, comprising zeolite  
carriers having ascorbic acid or araboascorbic acid or salts  
10 thereof or acyl derivatives thereof adsorbed thereon.

3. Detailed Description of the Invention

This invention relates to an indirect additive intended  
to prevent deterioration of foods by allowing it to be present  
indirectly in foods without direct addition to and mixing with  
15 foods, that is, to a deterioration inhibitor for foods,  
comprising zeolite carriers having ascorbic acid or  
araboascorbic acid or salts thereof or acyl derivatives thereof  
(referred to hereinafter as ascorbic acid or derivatives thereof)  
adsorbed thereon.

20 The indirect additive of the invention is a useful  
deterioration inhibitor for foods, which is used for the purpose  
of preventing oxidation of particularly fat and oil foods, to  
maintain food qualities such as food taste values, nutritional  
values and sanitary safety.

25 Heretofore, an antioxidant added to fry oil, for example  
butylated hydroxyanisole (BHA), butylated hydroxytoluene (BHT)  
or vitamin E, has been expected to have an antioxidant effect

on fat and oil foods such as fried foods, fried snacks etc., but it is known that when foods are heated and treated in fry oil, the antioxidant is rapidly scattered and decomposed, thus failing to exhibit its effect satisfactorily (Hashimoto: "Eiyo To Shokuryo" (Nutrition and Foods), vol. 13, p. 82 (1960)).

Some of ascorbic acid or derivatives thereof are practically used as antioxidants in oil and fat foods, but upon direct addition to foods, they are decomposed by heavy metal ions or amino acids in the foods or by liquid properties etc. of the foods, and thus the antioxidant capacity thereof may be reduced. If the amount of the antioxidant is increased to compensate for the antioxidant decomposed by the decomposition reaction, the taste, aroma, flavor or color of the foods may be adversely affected. The harmful influence of oxalic acid in decomposition products is also worried.

From this viewpoint, methods of indirectly adding various antioxidants have been attempted. Typical examples include application of BHT to wrapping paper (Caldwell et al.: Modern Package, vol. 32, p. 111 (1959)), indirect addition of BHA absorbent paper (Kajimoto et al.: Food Science and Technology Research, vol. 14, p. 72 (1967)).

However, the indirect addition of ascorbic acid or a derivative thereof as the safest antioxidant is not known. Indirect additives are designed such that a chemical in question is adsorbed or occluded by a support as much as possible. When it is put in foods, the chemical is released and demonstrates its capability. However, as for ascorbic acids, a suitable

support was not found. Therefore it has not been actually used.

In view of the foregoing, the present inventors have earnestly investigated indirect additives containing ascorbic acids. As a result, the present inventors found that zeolites sufficiently adsorb ascorbic acids, and the zeolite support adsorbing the ascorbic acids has superior capability as indirect additives for food preservation.

That is, the present inventors have found the following. Zeolites do not only well adsorb ascorbic acids but also act as vapor adjusting agents so that zeolites gradually release the anti-oxidant agents adsorbed by zeolites in the presence of vapor contained in the foods.

The deterioration inhibitor for foods according to this invention is produced by allowing zeolites that is 1 to 50 times, particularly 5 to 10 times, as much as an antioxidant to act on various solutions or suspensions of the ascorbic acid or a derivative thereof. The adsorption temperature is not particularly limited.

The ascorbic acid or derivatives thereof used in this invention include not only ascorbic acid and araboascorbic acid, but also salts thereof (Na and K salts etc.), acyl derivatives thereof (stearoyl and palmitoyl derivatives etc.) etc.

As the zeolites, naturally occurring clinoptilolite or mordenite type zeolite or synthetic zeolite (4A type, 5A type, 18X type, Y type etc.) can be used, among which synthetic zeolites (18X type, Y type etc.) having a relatively large pore diameter are desirable for the ability to occlude the object. Because

zeolites have occluded water generally, heating treatment not destroying their structure, for example treatment at 200°C for 2 hours, is necessary.

As the solvent used in preparation of the carriers, use  
5 is made of water, alcohols, ethers, aromatic hydrocarbons (benzene, xylene etc.), aliphatic hydrocarbons (n-hexane etc.), aliphatic ketones (acetone etc.) or halogenated hydrocarbons (chloroform etc.) etc. However, zeolites are known to have a selective adsorption action on polar molecules, and thus a  
10 non-polar solvent or a solvent that is poor in polarity is preferably used.

The carriers prepared as described above can be used not only as an indirect antioxidant for fat and oil foods such as instant Chinese noodles, cubic rice crackers, fried beans,  
15 peanuts, fried dough cookies etc. but also in keeping the freshness of tea, seaweed foods such as dried laver and green laver, and vegetables, or the freshness of fishes and shellfishes or in prevention of darkening of krill.

The usefulness of the deterioration inhibitor for foods  
20 according to this invention has been confirmed in the following experimental method etc.

That is, ascorbic acid monostearate was used as an antioxidant and adsorbed and carried onto 18X type zeolite, and this carrier was added indirectly to instant Chinese noodles,  
25 and prolongation of its shelf life was examined. The instant Chinese noodles subjected to the experiment was obtained by frying commercially available raw Chinese noodles in

antioxidant-free salad oil at a frying temperature of 140 to 150°C at a frying rate of 90 to 120 seconds every one meal and then milling the noodles, and had a water content of 4.8%, an oil content of 18.8% and a peroxide value of 16.1 (determined  
5 by a method described in "Kogyo Kagaku Zasshi" (Journal of Industrial Chemistry), Vol. 61, No. 10, 1557 (1958)).

Specifically, this experiment was carried out as follows:  
One group consisting of 10 bags each containing 20 g of the above instant Chinese noodles in an opaque oxygen-impermeable resin  
10 package having a white surface printed partially in color was prepared, and a porous polyethylene bag charged with 4 g of the above carrier was put into each of the above bags, and each bag was sealed and irradiated with a florescent lamp (80 W×4: distance 50 cm) at 40°C for 1 month. The content of the bag was well  
15 mixed every other day to achieve uniform irradiation with the fluorescent lamp. One sample bag was taken out every 4 days, and its peroxide value was measured. 18X type zeolite to which no ascorbic acid monostearate was added, was used as the control in this experiment and observed in a similar manner. The results  
20 of this experiment are shown in Table 1.

Table 1. Change in peroxide value of instant Chinese noodles during process of fluorescent lamp test

Number of days	Peroxide value		Number of days	Peroxide value	
	A	B		A	B
0	16.1	16.1	20	60	28
4	22	16.5	24	72.5	28
8	32	21	28	80	34
12	42	24.5	80	88	34
16	53	25			

A: In the presence of 18X type zeolite not carrying ascorbic acid monostearate

5 B: In the presence of 18X type zeolite carrying ascorbic acid monostearate

As shown in Table 1, it was revealed that 18X type zeolite carrying ascorbic acid monostearate, as compared with the zeolite not carrying it, significantly prevents an increase in the peroxide value and is significantly useful for prolongation of the shelf life of the oil and fat food.

15 When the food preservation compounds of the present invention is used, the anti-oxidant agent support prepared by the foregoing method are put into small bags that breathes well. For storage of a food, the food together with the small bag charged with the antioxidant carrier may be packaged in a packaging material made of a laminate of 2 or 3 oxygen-impermeable resin films, or may be packaged in a can.

20 This invention provides a deterioration inhibitor for foods, which has an antioxidant function durable for a prolonged period of time not only by using the extremely highly safe antioxidant as an indirect additive useful for prolonging the



shell life of foods, that is, keeping properties such as taste, aroma, flavor or color of foods for a prolonged period of time but also by utilizing the high keeping ability of the extremely highly safe zeolite carriers.

5           Hereinafter, this invention is described in more detail by reference to the Examples.

#### Example 1

2.0 g of ascorbic acid monostearate was dissolved in 100 ml n-hexane, and 10 g of 18X type zeolite was added thereto, 10 and an adsorption test was carried out for 8 days with occasional stirring at room temperature in the dark. In this adsorption experiment, 1.7 g of ascorbic acid monostearate was adsorbed onto 18X type zeolite.

The resultant 18X type zeolite carrying ascorbic acid 15 monostearate was used in the antioxidant test of instant Chinese noodles. The results are shown in Table 1 above.

#### Example 2

2.5 g of ascorbic acid was introduced into a left chamber of a W-shaped tube, while 10 g of synthetic Y type zeolite 20 (calcinated at 200°C for 2 hours) was introduced into a right chamber of the tube, and n-hexane was added little by little so as to not mix the two, and while both the left and right suspensions were separately stirred, an adsorption experiment was carried out at room temperature for 72 hours. The ascorbic 25 acid in the left chamber completely disappeared by adsorption onto the Y type zeolite at the right side.

Then, the above Y type zeolite carrying ascorbic acid was

used in the antioxidant test of instant Chinese noodles described above, and the peroxide value thereof 30 days thereafter is shown below. The same experiment was also conducted in the presence of the control i.e. type Y zeolite not carrying ascorbic acid  
5 (type Y zeolite only) or without adding ascorbic acid and type Y zeolite.

Table 2. Peroxide value of instant Chinese noodles after 80 days

Conditions	Peroxide value
In the presence of Y type zeolite carrying ascorbic acid	25
In the presence of only Y type zeolite	88
Not added	85
When the experiment was initiated	16

10

### Example 3

18X type zeolite carrying araboascorbic acid, obtained by the same treatment as in Example 2, was used in an antioxidant test of fried dough cookies (the fried dough cookies i.e. 280  
15 g canned product containing fried dough cookies in a laminated PP bag, produced by Shinjyuku Nakamura, was used 8 days after production).

A porous polyethylene bag containing 1.0 g of the above carrier was introduced into 1 can of fried dough cookies, and  
20 the can was then sealed and left at room temperature for 120 days, and the taste, surface, appearance and peroxide value of the fried dough cookies were compared with those in the presence or absence of 18X type zeolite only. The results are shown below.

Table 3. Appearance, taste and peroxide value of fried dough cookies after 120 days

Conditions	Appearance	Taste	Peroxide value
In the presence of 18X type zeolite carrying araboascorbic acid	Dry state	Normal	3.5
In the presence of 18X type zeolite only	Slightly dry state	Slightly bitter	8.0
Not added	Surface gloss disappeared	Strongly bitter	8.5
When the experiment was initiated			8.1

#### Example 4

- 5           2.0 g of ascorbic acid monostearate was dissolved in 100 ml ether and then 10 g of Y type zeolite was added thereto, and the adsorption reaction was carried out for 3 days with occasional stirring in a refrigerator. In this adsorption experiment, 1.7 g of ascorbic acid monostearate was adsorbed onto Y type zeolite.
- 10           Using the resultant Y type zeolite carrying ascorbic acid monostearate, an antioxidant test of instant Chinese noodles was carried out according to Example 1. The sample bag with its front facing upward was placed at the side of a south window and left there at room temperature for 60 days. The appearance
- 15           on the surface and the peroxide value as a result, are shown below. The experiment was also carried out in the presence or absence of the control i.e. type Y zeolite not carrying ascorbic acid monostearate or those without addition.

Table 4. Surface appearance and peroxide value of instant Chinese noodles after 60 days

Conditions	Surface appearance	Peroxide value
In the presence of type Y zeolite carrying ascorbic acid	Discoloration on the surface	12.0
In the presence of only type Y zeolite	Discoloration on both sides	27.0
Not added	Discoloration on both sides	27.5
When the experiment was initiated	Slightly pale yellow	7.1

#### Example 5

- 5           100 ml of water was added to Y type zeolite carrying ascorbic acid (degree of adsorption 100%) prepared in the same manner as in Example 2 from 2.5 g ascorbic acid and 10 g synthetic Y type zeolite, and the suspension was then stirred at room temperature for 1 hour and centrifuged to give a supernatant.
- 10   This eluting operation was repeated additionally once, and the resultant supernatant was combined with the previous supernatant, and the total volume was adjusted with water to 200 ml. The total amount of ascorbic acid in the supernatant, determined by iodine titration, was 2.48 g (degree of elution, 99.2%).
- 15           It was confirmed from this experiment that the zeolites are superior in the ability to adsorb and occlude ascorbic acid and derivatives thereof, while the adsorbed and occluded ascorbic acid and derivatives thereof are easily released therefrom with water.